

Assessing student perceptions on hybrid learning

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ABSTRACT

COVID-19 has put a large impact on the education system all around the world. School, college and university students are forced to attend hybrid learning (HL) classes. This has posed challenges to the learners to adapt with the new learning system. The objective of this case study is to examine students' perception on HL, in particular, the impacts on students' learning experience. This study used survey as the methodology and the instrument for data collection is questionnaire. Data was collected from 93 students of five mathematics classes at Universiti Teknologi MARA (UiTM), Malaysia. Their perceptions in five learning aspects were analyzed, namely the accessibility to the online learning system, the effectiveness of both HL and face-to-face (f2f) learning, the pedagogical, technical and social aspects. The results have shown positive acceptance on HL and they enjoyed the new learning experience which uses both f2f and online mediums. This finding indicated that HL has a good potential to be extended to other courses at the university. This also indicated the opportunity for the university to enhance the teaching and learning methods and support the HL system in terms of moral and physical assistances.

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1. INTRODUCTION

COVID-19 has prompted the online learning design across all levels of education disciplines around the world. When it comes to education, the public has been debated heavily on the government's plan to reopen schools and higher learning institutions. The conversation mainly discussed the crucial issue of how to help students in transforming from online to classroom learning. Students need to adjust with new school environment after more than a year of learning at home. To face this problem, hybrid learning (HL) is perhaps the best solution for helping and supporting students to cope with this transition [1].

There are many definitions on HL given by several researches. Rahmani and Daugherty [2] have defined HL as a teaching and learning process in which at least half of learning activities are done via an online platform. Star *et al.* [3] stated that HL or blended learning is learning that combines all forms of learning, for example online, live and conventional face-to-face (f2f). HL are can also be explained as a combination of f2f learning methods in the classroom with the material provided online [4], [5]. A hybrid learning environment opens the opportunities for education teams to find alternative methods to enhance traditional teaching and learning setting. HL has added advantages because in addition to a f2f approach, HL also uses information, communication and technology (ICT), either mobile or nonmobile technology. The diffusion of ICT has enabled the higher education institution to offer the educational services to a wider marketplace and beyond geographic locations [6]. This innovation can increase the effectiveness of teaching

and learning process and the effectiveness of this approach is commonly measured by student success in the course and their satisfaction with the delivery system. In addition, educational institutions use varieties of learning approach to encourage better performance from students in accomplishing the course outcomes. To ensure a good learning experience, some institutions would provide the technology inside the traditional classroom, hoping that the facts delivered could be easily understood [7]. There are many aspects have to be considered when designing and delivering a course using hybrid approach. These includes the design of the content delivery in both mediums, technology knowledge and skills of the instructors, interaction between both parties, as well as the facilities that directly support the teaching and learning process

This new remote learning has posed a challenge for learners in schools, as well as in higher learning institutions. They struggle with high expenditure on gadgets and machines, advanced and new technology, internet access and connectivity, unconducive learning conditions and other problems. These difficulties have put a pressure to the education system and undeniably have resulted in academic stress to them. Therefore, the objective of this case study is to examine students' perception on HL, in particular, the impacts on students' learning experience. The result of this study will be a useful indicator to the university to give support on the improvement to the HL environment in terms of the moral and physical supports, besides improving the communications and connections. It is hoped that with this improvement, the students will utilize the advantages of HL and consequently appreciate and enjoy the teaching and learning environment.

From the traditional approach, the teaching and learning styles have moved to online method and then a mix of online and physical learning environment. During the movement of these learning design environments, there are many issues and challenges faced by the education providers as well as the learners. Many researchers explored the best practices that are able to facilitate the learning environment in facing the challenges. Some examples are the utilization of learning management system (LMS) [8]–[10], collaborative co-creation and co-design of a resource guide [11], prototype HL model to minimize academic stress amongst the digital native's generation [12] and remote standardized patients (RSP) for medical students [13]. These are some of the best practices recommended for designing HL environment.

In a study by a social enterprise project, it was found that more than half of the sample students responded positively for HL method and preferred in continuing the learning approach [14]. On the other hand, only a third preferred the traditional physical lesson method. A study to identify the phase in HL which has the highest influence on the performance of the students in computer programming course was done by previous researchers [15]. There were 35 students have responded to email questionnaires. The students' feedback was evaluated based on their satisfaction on the conceptualization, the construction and the dialogue phases between lecturers and students of the HL activities. The construction phase of the HL is the most significant in the enhancement of students' performance. Therefore, the HL approach needs to closely focus on the construction of the computer programming syllabus to improve the students' satisfaction level. In addition to this, the conceptualization phase and the dialogue phase between lecturers and students need to be improved so that it can contribute to the students' performance in the future ahead.

Cabero, Llorente, and Puentes [16] presented a theoretical model of blended learning, called as b-learning, to determine the teachers and students' blended learning experience in Pontifical University of Dominican Republic. The data were collected by using students' satisfaction questionnaire, as well as interviews with students and lecturers. The finding of the study has shown that there is a favorable attitude shown by teachers and students in blended learning. In addition, they found that there is a need for universities to include centers that support teacher training. There are also advantages for implementing this b-learning as the students showed positive feedback on the use of internet in formative actions, the use of the online communication tools and the platform used.

Eliveria *et al.* [17] introduced a HL environment to a group of students through a learning management system. The purpose is to investigate students' participation and enthusiasm in a HL environment. The result of the survey which was presented to the students at the end of the semester has revealed that students prefer online activities. They agreed that in-class activities do help them to learn and understand the course content. The students also share their insight of the way to handle HL environment to make it successful. The results from the study could help to guide future attempts of a HL setting.

A study by Aristika *et al.* [18] aimed to test the effectiveness of HL in improving students' advanced mathematical thinking (AMT) which is the prioritized mathematical abilities needed to be developed in learning mathematics during tertiary education. They used a quasi-experimental design, and the subject of this study was students from two classes of multi variable calculus course at a university in Bandung. One class was chosen as the experiment group and the other class as the control group, while each class consists of 40 students. MANOVA test with normality and homogeneity tests were performed as a prerequisite test. The results have shown a significant difference in AMT between the HL and conventional groups, where HL had a higher AMT. Besides this, there is also a significant difference in the AMT between the high motivation group and the low motivation group, where high motivation has a higher AMT.

A study to find out students' perceptions of the blended learning environment concerning its design and its influence on their critical thinking was put forward by Lu [19]. The impact on critical thinking is examined in the study as it is closely linked with blended learning besides it is an indispensable skill that must be possessed by the citizens of modern society. Questionnaires and interviews were used to collect data from the sample students. The findings have shown that the students held positive perceptions on the blended learning environment, and they agreed that it is able to promote critical thinking in many aspects. Marco, Venot, and Gillois [20] intended to determine if the acceptance of a HL model would affect students' way of learning, specifically the students' intention to use technology. 38 students within a single year of study in the midwifery program were selected as the respondents. From the results obtained, due to the flexibility of the tools, the learning approaches were not affected by the acceptance of a HL model.

Huang [21] has investigated students' perceptions of blended learning, f2f learning and online learning. A sample of 296 university students was selected to examine their perceptions towards the learning modes in an English course. The result has shown that most students preferred blended learning as compared to the other two modes. The f2f and fully online learning were also considered to play different roles in English class. They admit that fully online learning was more advantageous to listening, while f2f learning was able to promote the learning of world knowledge and helped to improve their interests in learning English. The findings of the research provide insight on how different learning modes interplay role with each other in the blended learning context so that the learning environment can be better integrated for betterment of the learners' experience.

A prototype HL model was developed to minimize academic stress amongst the digital native's generation (DNG) [12]. The model was designed by combining face to face and online learning using the Design-Based Research (DBR) method. The method incorporates two stages, which are problem analysis when learning, and stage of solution development. The study found that the DNG experiences relatively high academic stress, so it is necessary to develop a prototype of a flipped classroom-type HL model. The model will consider the learning style and academic culture and based on the sociocultural revolution theory.

There are many other studies which have implemented surveys and interviews to explore the student acceptance, perception and satisfaction in response to the new hybrid, blended and online learning [22]–[30]. There are also studies which introduced a new model of learning approach to tackle the issue of students' academic stress and pressures. Whilst most of the research focus on the perception of students towards the new learning approach as a whole, this present study will narrow down the focus to five learning aspects, which are the accessibility to the online learning system, the effectiveness of both HL and f2f learning, the pedagogical, technical and social aspects. This case study is intended to examine the students' perception on HL, in particular, the impacts on students' learning experience.

2. RESEARCH METHOD

This study was implemented to know the students' perceptions on hybrid learning experience in five mathematics classes at the Universiti Teknologi MARA (UiTM), Malaysia. In the hybrid environment, the process of teaching and learning was carried out using both mediums, f2f and online. The lecturers in hybrid classes used web camera in the physical classroom, whereby some of the students were attending the sessions physically and the rest were participating through online platforms. For the purpose of this study, each student was required to attend a minimum of ten hours of f2f learning in classroom throughout the semester. The survey instrument used was a questionnaire. The data collection was implemented in mid 2021 and there are 93 students who have responded to the questionnaire. The questionnaire consisted of Likert scale type questions, as well as open-ended questions. The questionnaire consists of six parts and it is designed such a way to focus on certain aspect in each part.

Part A focuses on the basic demographic profile of the respondents. It consists of information on their age, gender, current semester, course code and information technology (IT) skills. Part B looks at the students' perceptions on HL. Among the questions include the platform used for online teaching, preferences on the different mode of learning, the accessibility to online learning system, the enjoyable and unhappy experience with HL.

Part C intends to determine the effectiveness of hybrid learning and physical f2f learning. Student were asked to rate the effectiveness of HL in terms of increasing knowledge, practical skills, social competencies, rate the effectiveness of physical f2f learning in terms of increasing knowledge, practical skills, social competences using Likert scale from 1 to 5, where 1=extremely ineffective and 5=extremely effective. In Part D, students were asked on the pedagogical aspect of HL. Likert scale from 1 to 5, where 1=extremely disagree and 5=extremely agree; consists of the questions on the learning objectives, organization of each lesson, learning environment, expectations on assignments, planning of activities, the

course content, presentation of the course content, the mixture of online and physical classroom learning, and other related questions on pedagogical aspects.

The technical aspects of HL are focused in Part E. The same Likert scale is used to ask questions on the accessibility to the online materials, the students' convenient time for learning, the availability of the online materials, students learning speed, students' self-exploration, as well as their comfort using technology. Part F seeks to find the students' perception on the social aspect of HL. Students were asked on their communication with other students and lecturers, the feedbacks received, the attitude of the lecturer and friends, as well as their satisfaction level on HL. To ensure the instrument used is reliable, the reliability tests of Cronbach's alpha on the survey constructs were also conducted.

3. RESULTS AND DISCUSSION

Several studies have shown that hybrid learning can be very challenging for some reasons and can be very beneficial to student and instructors at the same time [18], [20], [23], [25]. The results obtained from this study exhibit similar pattern. The discussion of the finding is explained in two parts.

The first part of this section discussed the demographic profiles of the respondents and it summarized as in Table 1. The categories of the students are divided into Junior and Senior, which indicate that they are at Semester 1 to Semester 3, or Semester 4 onwards, respectively. The percentage of them is divided almost equally as 54.8% are the Junior, whereas 45.2% of them are Senior. A large percentage of the respondents are female (82.8%) and only 17.2% are male students. The rate of their IT skills is almost bell-shaped curve as majority of them are categorized having good to very-good skills.

Table 1. The demographic profiles of the respondents

Measure	Item	Count	Percentage (%)
Year	Junior (Part 1 to 3)	51	54.8
	Senior (Part 4 and above)	42	45.2
Gender	Male	16	17.2
	Female	77	82.8
Rate of IT skills	Outstanding	7	7.5
	Very good	47	50.5
	Good	37	39.8
	Fair	2	2.2

In the second part of this section, the mean and standard deviation of several aspects is encapsulated in Table 2. The result has shown that students have positive perception on hybrid learning, based on the mean values that are close to 4. This is consistent with the finding in [18], [20], [23] which stated that students are fond of HL on certain aspects, for instance saving time in commuting to university. Furthermore, finding from Aristika *et al.* [18] indicates that 50% of engineering students are saying yes to HL.

The values of Cronbach's alpha for all aspects evaluated have recorded the scores of greater than 0.70, suggesting that the test items have relatively high internal consistency. This scale reliability also indicates that the set of test items used are closely related as a group and the internal consistency of the survey questions are acceptable. The aggregated results in terms of the accessibility to online system, the effectiveness of HL and f2f learning, the pedagogical, technical and social aspects are explained next.

Table 2. The mean, standard deviation and Cronbach's alpha score on aspects of survey questions

Aspects evaluated	Mean	Standard deviation	Cronbach's alpha
Accessibility to online learning system	3.74	0.75	0.8495
Effectiveness of HL and physical f2f learning	3.77	0.75	0.9045
The pedagogical aspect	3.87	0.75	0.9347
The technical aspect	3.99	0.77	0.9142
The social aspect	3.86	0.78	0.9390

Table 3 shows the result obtained on the rate of accessibility of the respondents to the online system. The Likert scale is 1-extremely difficult to 5-extremely easy. The students agreed that it is easy to login to the online learning system, and this is reflected by the mean score of 3.98. Among the commonly used learning system at the university are Microsoft Team, Google Meet, and Zoom. They also found that it is easy to complete the exercise online (mean=3.71). As mathematical problem solving involves many equations and symbols, majority of them would prefer to upload their handwritten answer into the online system as their

method to complete the given exercises. Students also found that it is easy to get technical help when they have technical problems (mean=3.65) and easy to understand the instruction in the class assessments.

Table 3. The result on the rate of accessibility to online system

Survey question	Mean
Easy to login of the online learning system	3.98
Easy to understand the online instruction on exercise, assignment, and others	3.64
Easy to complete exercise online	3.71
Easy to get technical support	3.65

Table 4 shows the result on the effectiveness of HL and physical f2f learning. The Likert scale used is 1-extremely ineffective to 5-extremely effective. All the output results recorded for the effectiveness of the physical f2f learning have scored high, which are between 3.9 to 4. This indicates that the students agreed that the physical f2f learning is effective and still relevant in these days. The effectiveness of this mode of learning was measured in terms of the social competencies, practical skills and its ability to increase knowledge. In addition to this finding, the effectiveness of HL falls slightly below the physical f2f learning with the score between 3.5 to 3.8. This implies that the HL is less effective when compared to the f2f learning. This finding is similar to the result obtained by Aristika *et al.* [18], in which 50% of the engineering students are saying no to HL because of the same reason. The lowest score was recorded for the effectiveness in social competencies (mean 3.50), followed by the effectiveness in practical skills (mean=3.58) and finally the effectiveness in increasing knowledge (mean 3.73).

Table 4. The result on the effectiveness of HL and physical f2f learning

Survey question	Mean
HL is effective in terms of increasing knowledge	3.73
HL is effective in terms of increasing practical skills	3.58
HL is effective in terms of increasing social competencies	3.50
The physical f2f learning is effective in terms of increasing knowledge	3.91
The physical f2f learning is effective in terms of increasing practical skills	3.95
The physical f2f learning is effective in terms of increasing social competences	3.97

Table 5 shows the result obtained on the pedagogical aspect of HL learning environment. The Likert scale denotes 1-extremely disagree to 5-extremely agree. The mean score for this aspect ranges between 3.73 to 4.05. The score indicates a positive pedagogical aspect that have been obtained by implementing HL. The respondents have given high score of 4.05 on the clear statement of learning objectives in each lesson. They would be able to anticipate the lesson when they are well-informed of the learning objectives in the beginning of each lesson.

Table 5. The result on the pedagogical aspects of HL

Survey question	Mean
The learning objectives are clearly stated in each lesson	4.05
The organization of each lesson is easy to follow	3.92
The learning environment helps me to focus	3.73
The expectations of assignments are clearly stated	3.83
The activities are planned carefully	3.91
The content of the course worked well in a HL environment	3.82
The presentation of the course content was clear	3.95
I understand why this course mixed online and classroom activities	3.82
I feel the classroom activities helped me to learn and understand the lesson	3.90
The HL encourages me to search for more facts than the traditional methods	3.76

At the other end, the lowest score of 3.73 was recorded in the statement that HL helps them to focus. Even though the score is considered satisfactory, however, the root causes of this issue should never be under looked. The main reason for this problem may be due to the distractions that occurred during the HL classes. Some students are on the net while others are sitting in the classroom. The interchange of instruction and attention to the two different groups of students by the instructor will possibly create the distractions during the teaching and learning process and has affected the students' focus. This finding is consistent with

research by Huang [21] that the interpretation and generalization of the results must be observed. This is because HL does not only involved difference in its delivery format, but also in terms of technological tools and pedagogies. Therefore, the comparison on the pedagogical aspects could be rather subjective.

Table 6 shows the result on the technical aspect. The scale denotes 1-extremely disagree to 5-extremely agree. On the average, the technical aspects of HL have obtained scores between 3.86 to 4.13. This particular aspect focuses on the ability of the students to adapt with the technicality of HL. This includes the comfort, the self-exploration, the time management, the availability of the learning materials, among others. The highest score was recorded on the matter of the material availability (mean=4.14), whereas the lowest score is the comfort of using technology (mean=3.86). This finding supports the revelation of Eliveria *et al.* [17] which stated that the knowledge using technology has motivated the students' engagement in HL environment. These technical aspects have strongly influenced their interests in completing the coursework assigned to them.

Table 6. The result on the technical aspect of HL

Survey question	Mean
I do not have problems to access online materials	3.95
I decided to learn at times convenient to me	4.10
The online material is available at locations suitable for me	4.13
I am allowed to work at my own speed to achieve my learning objectives	4.01
Using HL, I can explore the interest of my own	3.88
I feel comfortable using technology and taking course online	3.86

Table 7 shows the result obtained on the social aspect of HL. In this aspect, students were asked on their communication with other students and lecturers, the feedbacks received, the attitude of the lecturer and friends, as well as their satisfaction level on HL. The scale used in this criteria is 1-extremely disagree to 5-extremely agree. This social aspect evaluates the students' perception on communication between them and the lecturers, as well as the communication among themselves. In general, the scores obtained for this aspect are satisfactory (between 3.68 to 4.02). The students were happy with the social interaction with the friends and lecturers. They enjoy the HL classes, and they feel free to ask questions to the lecturers or friends. As highlighted by Faisal and Sarie [1], this social interaction helps the student to develop communication and comprehension skills. They need direct social experience and interaction to understand and make sense of abstract ideas. In addition, the HL environment provide students with the opportunity to seek help. This is something that they reluctant to do during the online learning, as they would prefer to figure it out by himself rather than seeking for help from teachers and classmates.

Table 7. The result on the social aspect of HL

Survey question	Mean
I communicate with other students in this subject physically and virtually	3.74
I can ask my lecturer what I do not understand	3.91
I can ask other students what I do not understand	4.02
Other students respond promptly to my request for help	3.93
The lecturer gives me quick comments on my work	3.88
My classmates and I regularly evaluate each other's work	3.68
I was supported by a positive attitude from my lecturers and classmates	3.93
I enjoy HL classes during the pandemic	3.79
I feel a sense of satisfaction and achievement about this HL environment	3.80

At the end of the questionnaires, the respondents were asked to describe their experience in HL. The students in the classroom, together with the students on the online platform expressed their perceptions on HL in only three words. Figure 1 shows the students' description on their experiences in HL. The highlighted and bigger words show the most frequently used words, while the lighter and smaller words indicate the less frequent used word to describe their experience. The word "good", "fun", "happy" and "nice" are the most common words used by students and this shows that HL give positive experiences to them and they enjoy learning mathematics using the HL approach.



Figure 1. The word cloud to describe HI

4. CONCLUSION

A hybrid learning system that has been globally implemented is a paradigm for many students. This study has investigated the students' perception on HL at Universiti Teknologi MARA. The respondents from mathematics classes have rated their perceptions in five aspects, namely the accessibility to the online learning system, the effectiveness of both HL and f2f learning, the pedagogical, technical and social aspects. In all of the aspects evaluated, the results have shown that the students' perception on HL was positive. They enjoyed the new learning experience which uses both f2f and online medium. This is reflected from the result obtained from the questionnaires in which the mean score of the Likert scale ranges from 3.74 to 3.99.

In conclusion, the results obtained from this study should inspire the university to give high support in terms of moral and physical assistance in the hybrid learning environment. As a matter of fact, HL can be regarded as a new teaching and learning approach as compared to the traditional f2f delivery method. There are many aspects that needs to be explored and improved to enrich this educational approach. The finding of this study may provide a foundation for further research and foster the HL to be extended to other courses at the university. This exploratory survey only involved a small sample size, the finding should not be generalized to the whole population of the university. Further research should use larger sample size so that it will represent the entire university population experiencing HL.

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